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LUTETIA.

Elements. By Mr. W. Ellis, of the Durham Observatory, deduced from the Durham Observations of Dec. 27, 1852, and Jan. 2, and Jan. 11, 1853.

Epoch 1853, Jan. 1, 0h Greenwich M.T.

	°	′	″	
Mean Anomaly	45	36	19·8	Mean Equinox of Epoch.
Long. Perihelion	3	41	41·9	
— Ascending Node	80	21	36·3	
Inclination	3	5	6·0	
Angle of Eccentricity	6	36	44·5	
Log *a*	0·4170508			

The middle observation is nearly satisfied by these elements.

An ephemeris by Mr. Ellis, founded on these elements, was sent at the same time; it extends from January 23 to March 6. Copies have been sent to those observers who attend to the small planets. (*See also Ast. Nach. No.* 847, p. 116.)

Letter from Mr. Lassell.

" *Valetta*, *29th Dec.* 1852.

" Though I am almost afraid of *Saturn* having become an exhausted subject, yet, as he has since my last exhibited some change of phenomena, I will trouble you with another sketch of him, as he now appears, and a few more last words. Last night, after an interval of rather broken weather, the sky was unusually tranquil, and in the intervals of passing clouds I obtained views of the planets quite equal, if not superior, to any I have ever before seen. The power principally used was 650, speculum C in the tube, which afforded an image in respect of size, sharpness, and brilliancy, hitherto to my eye unexcelled.

" I have spoken highly of the definition of the other speculum, A; and certainly, under the best circumstances, I doubt if the *vision* would suffice to inform me which of the two specula was in the tube, so nearly are they alike; yet, in the average of many nights' observation, I think I incline to prefer C, from an impression of its greater uniformity of action. I doubt if I ever before produced consecutively two two-foot surfaces, so undistinguishable.

" For some time, as well as especially last night, I have noticed a peculiarity of form in the shadow of the ball of *Saturn* upon the ring, which I have endeavoured as faithfully as I can to depict in the accompanying drawing. Its curvature suddenly changes at the division of the rings, the part projected upon the ring B being almost, if not exactly, a right line. Would a *very small* amount of curvature (convexity) of the surface of ring B suffice to change the otherwise convex edge of the shadow into a right line? There cannot be a *large* amount of convexity of the surface, as it would then be optically manifest. A very similar appearance I noticed, less distinctly, of the shadow of the ball on the western arm before opposition, mentioned in a former communication — probably it may be now more manifest, from the greater breadth of the shadow, or I have been led to notice it more. The 'spot' which I also spoke of being visible on the limb opposite to the shadow, has now no existence, and I think it may have been the first and last appearance of this angle of the shadow on the respective limbs.

"The shadow of the ring upon the ball has now become very obvious near the north pole, but exhibits a striking contrast to the shadow just spoken of in depth of shade; for while the latter is as perfectly black as anything can be, the former is only a dark grey, about the shade of the dark ring near the ansæ. In breadth, this shadow is now equal to rather more than half the breadth of ring A at that part which is contiguous to the shadow; and it appears to deepen in shade from its extreme northern edge to its junction with the ring. Probably the very oblique direction in which the shadow must fall on the rotundity of the planet may account for this paleness.

"I compared under these advantageous circumstances the two ends of the obscure ring, and indeed examined its general form, and could detect no want of symmetry or regularity of curve. In estimating, however, its similarity of form at the two ends, the judgment is somewhat disturbed by the projection of the shadow of the ball on the dark ring on the south following side. I noticed a difference of colour, the preceding end being a bluish-grey, while the following had a touch of yellow or brown in its greyness.

"The belts have altered considerably since my last letter. The division of the ruddy belt is much less plain. The first of the blue belts, which was very dark and decided, has nearly disappeared; the second, though fainter, is still traceable, while the small circular polar one remains as dark and visible as ever. I do not observe any recurring spot on the surface of the planet by which his rotation on his axis might be observed, though I have sometimes noticed that the shading on the ring B has not been the same at both ends. This, however, has not been sufficiently constant or distinct to serve any practical purpose.

"During the fine atmosphere of last night, I could not but be greatly struck with the beauty of the Saturnian picture afforded me. With the observing power of 650 nothing seems wanting to the precision of the image but the removal of the *minute flickerings* of the atmosphere, which with this power, and the aperture of my telescope, I do not recollect ever being unconscious of. The edge of the ring seems as hard and sharp as a metallic rim, and on a perfectly black ground in the quietest atmospherical moments. A sufficient proof of this, scarcely, however, to be duly estimated by those who have not been accustomed to look out for and observe the closest of *Saturn's* satellites, is, that *Mimas* was kept steadily in view, and watched up to his greatest western elongation, notwithstanding the splendour of the planet and widely-opened ring shining full in the field. I have introduced into the drawing

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the approximate positions of the two nearest satellites as they appeared about 10^{h} 0^{m} Greenwich mean time. The greatest elongation of *Mimas* was estimated to occur at 10^{h} 4^{m}, its distance from the end of the ring I estimated to be five-sixths of the sum of the breadths of rings A and B. This may serve as a guide to the possessor of any telescope powerful enough to give hopes of seeing this most minute and delicate object. *Enceladus* passed his inferior conjunction at about 8^{h} 12^{m} Greenwich mean time.

"This is really a splendid climate. There is now (at Christmas) just that amount of cool freshness in the air which makes exercise agreeable, and the valleys putting on their mantle of green give even the rock of Malta a fertile aspect. The enjoyment a walk affords in this transparent atmosphere, under this glorious sun, giving its warm colours to the architecture, and all manner of tints to the crystal waves as they break upon the shore, is more than my eloquence suffices adequately to convey to you.

"We all feel we have rather too much to do. People here think I am a gentleman of fortune, who has brought a large telescope here 'for his amusement!' How different from the fact: I call it real labour, and shall rejoice when my emancipation comes."

Extract of a Letter from Mr. Lassell.

"*Valetta*, 10*th Jan.* 1853.

"I have now to hand you the results of my observations upon *Neptune* and his satellite, in which you will see what I think of the probability of finding other satellites. With *Uranus* I have not quite done yet, though I am pretty well settled in the conclusion that he has no more satellites visible with my means than the four, so that my discoveries in this way are likely to be more negative than positive. However, I think it is high time that *Uranus's* establishment should be reduced. He has been luxuriating these many years with a retinue that I really believe does not belong to him, and, therefore, he must be cut down to four attendants, until some astronomer arises rich enough to present him with some more.

"We have the weather rather more broken now, but yet, I think, more starlight than occurs in the best seasons in England—quite as much as I have health and strength enough to use. We are astonished and delighted with the wonderful display of clusters and nebulæ a little below the equator, in the neighbourhood of *Orion*. One might be entertained and gratified by the hour, just to take the telescope in hand, and sweep slowly over the milky way east of that constellation. The full light of this telescope, charged with a power of from 160 to 200, and a field of about 20′ in diameter, with its precision of image and absence (with these powers) of sensible atmospheric disturbance, affords such pictures of the sidereal heavens as I cannot at all adequately describe, and as call forth continually from the observer involuntary exclamations of delight and astonishment."